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Short communication

Retinal toxicity due to canthaxanthin. Case series☆

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ABSTRACT

Introduction: Canthaxanthin is a chemical product used to tan the skin. Its most frequent adverse effect is canthaxanthin retinopathy.
Purpose/methods: Report, case series.
Results: Two female patients, one 42 years-old and the other 72 years-old, with signs of retinopathy due to canthaxanthin. Complete ophthalmology examinations were carried out. The peripheral fovea birefringent deposits with internal retinal involvement were studied using multimodal imaging.
Conclusion: Canthaxanthin retinopathy is rare. Multimodal imaging may provide important data for the differential diagnosis of crystalline retinopathy.

Toxicidad retinal por cantaxantina. Serie de casos

Palabras clave:
Cantaxantina
Toxicidad
Retinopatía

RESUMEN

Introducción: La cantaxantina es un producto químico utilizado para el bronceado de la piel. Su efecto adverso más frecuente es la retinopatía por cantaxantina.
Propósito/métodos: Serie de casos.
Resultados: Dos pacientes de sexo femenino de 42 y de 72 años, con signos de retinopatía por cantaxantina, se realiza examen oftalmológico completo, se detectan depósitos birrefringentes perifoveales, fóvea con compromiso de la retina interna, se constata con estudio por imágenes multimodal.
Conclusión: La retinopatía por cantaxantina es poco frecuente, el estudio por imágenes multimodal puede aportar datos de relevancia para el diagnóstico diferencial de la retinopatía cristalina.

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Introduction

Canthaxanthin is a natural carotenoid pigment synthesized by microorganisms and plants. Human beings ingest it through fruit, vegetables and fish. Acceptable daily intake is 0.03 mg/kg/day. As with other carotenoids, it is soluble in fat and has an intense red-orange color. It is utilized as ingredient in the production/manufacturing of food coloring, dyes and capsules for aesthetic skin tanning. Once ingested, it accumulates in the dermis and subcutaneous cell tissue. Previous publications have concluded that this chemical product is not genotoxic, is free of adverse effects on the reproductive system, free of carcinogenic risk as well as of allergic potential as oral medication.[1] However, adverse effects on human health have been reported, with canthaxanthin retinopathy being highly relevant.

Canthaxanthin retinopathy was described by Cortin et al. in 1982.[2] It expresses through the presence of yellowish-reddish birefringent crystalline deposits arranged in rings around the macula and the optic disc.[3] The development of said retinopathy is linked to the accumulated amount of ingested canthaxanthin.[4] In addition, concurrent ocular diseases such as ocular hypertension, focal retinal pigments, epithelial changes[5] and serous central chorioretinopathy[3] have been suggested as predisposing factors for the development of intraretinal crystals. One report describes the case of aplastic anemia associated to the intake of canthaxanthin.[6]

The evolution of 2 clinic cases of canthaxanthin retinopathy assessed with color retinography (color RG), spectral domain optical coherence tomography (SD-OCT), autofluorescence, infrared image and pseudo-color image (Spectralis OCT, Heidelberg Engineering, Heidelberg, Germany) is described.

Clinic case reports

First case

Female, 42, who consulted for presurgery assessment prior to refractive surgery. Her history comprised intake of intermittent canthaxanthin capsules for aesthetic tanning during the past 20 years (“Broncearte”, canthaxanthin 30 mg per capsule, 3 per day during 10 days followed by one capsule per day during the summer months). No other relevant personal or familiar antecedents were reported.

Best corrected visual acuity was 1 in right eye and 0.8 in left eye. Biomicroscopy of both eyes and the rest of anterior segment examination did not show significant morphological alterations.

Ocular fundus biomicroscopy revealed yellowish and superficial birefringent crystalline deposits with annular peri- and parafoveal distribution without involving the fovea. RG (Fig. 1A and B, right and left eye respectively) showed dotted birefringent images arranged in rings around the fovea and the papilla. Pseudo-color image (Fig. 1C right eye and D left eye) showed refringent dotted images as in RG. Autofluorescence (Fig. 1E and F) showed dotted hypo-autofluorescent zones in the sedimentation areas corresponding to a screen effect caused by the deposits that were not linked to pigment epithelium defects. Right eye (Fig. 1G and H) and left eye (Fig. 1I and J) SD-OCT showed multiple dotted hyper-reflective lesions without posterior attenuation in macular radial sections and vertical sections of the nasal parafoveal sector, predominantly at the level of the inner plexiform layer.

In this case, medication was contraindicated and clinic control was established to discard systemic compromise.

Second case

Female, 72, who consulted for routine ophthalmological checkup. She exhibited history of intermittent canthaxanthin capsules taken for aesthetic tanning (“Broncearte”, 2 capsules per day, intermittently at least during 20 years). The patient had not taken said capsules during the path 3 years. Clinic records comprised arterial hypertension, dyslipidemia, thyroid nodules, tobacco smoking and vitamin B12 deficit. Ophthalmological history comprised intermediate age-related macular degeneration.[7] Visual acuity was of 1 in both eyes. Biomicroscopy did not reveal significant alterations, intraocular pressure was 12 mmHg in both eyes, while ocular fundus showed soft drusen in both eyes, pigment epithelium anomalies, clearly defined papillary edges, peri/parafoveal and nasal parapapillary yellowish birefringent ring-shaped deposits verified with retinographic images, OCT, pseudocolor, infrared and autofluorescence. The birefringent material was differentiated from drusen mainly by means of SD-OCT, which found that the birefringent deposits were in the inner plexiform layer while the drusen were below the pigment epithelium layer (Fig. 2).

Color RG (Fig. 2A and B, right and left eye respectively) showed ring-shaped dotted birefringent images around the fovea, medium and large soft drusen and pigment epithelium anomalies. The pseudo-color image (C and D, right and left eye) as well as RG showed the refringent dotted images, drusen and pigment epithelium anomalies. Ocular fundus autofluorescence (E and F, right and left eye respectively) showed parafoveal dotted hypo-autofluorescent lesions corresponding to the refringent crystals that produce screen effect in RG and with pigment epithelium anomalies, with hyper-autofluorescent lesions compatible with signal increase due to lipofuscin (soft drusen). Finally, macular horizontal SD-OCT sections (Fig. 2G and H, right and left eye respectively) showed birefringent images as multiple dotted hyper-reflective lesions without posterior attenuation located in the inner plexiform layer, which could be differentiated from soft drusen due to their outer location compromising the pigment epithelium layer.

Canthaxanthin intake was also contraindicated in this patient.

Discussion

Canthaxanthin is a natural carotenoid utilized for coloring food, for skin pigmentation in vitiligo treatments and for treating photosensitivity disorders (erythropoietic protoporphyria, psoriasis and photosensitive eczema), which is ingested in high dosages as an oral tanning agent.